

## Research Article

# A study of cutaneous manifestations associated with diabetes mellitus

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### ABSTRACT

**Background:** Diabetes mellitus is a fairly common medical disorder that involves almost every specialty in its spectrum of clinical manifestation, and up to 1/3<sup>rd</sup> of patients with diabetes mellitus are estimated to have cutaneous changes. In other words using broadest criteria all subjects with diabetes will develop cutaneous manifestations of this disease.

**Methods:** A total of 100 diabetic patients with cutaneous manifestations, who attended skin OPD at Civil Hospital, Belgaum, Karnataka, India and K.L.E'S Hospital and Medical Research Centre, were randomly selected. The present study was conducted over a period of 22 months from March 1995 to December 1996. Total 100 cases were included in this study. The male to female ratio is 1.6:1 approximately. Detailed history, physical examination, cutaneous and mucous membrane involvement examination was done. Diabetes Mellitus was confirmed by urine sugar and blood sugar estimation. The diagnosis of diabetes mellitus was done on the basis of criteria laid down by national diabetic data group. Urine and blood sugar estimation was done in all the cases.

**Results:** Fungal infections were common cutaneous manifestation followed by bacterial infections and generalized pruritus. Those patients who were on oral hypoglycaemic drugs, insulin therapy found to have photodermatitis and localized lipoatrophy. The common associated skin diseases with diabetes mellitus were fungal infection (38%) and viral infections (2%). Unexplained generalized pruritus was observed in (17%) cases, followed by pruritus ani is (3%) and prurigo simplex in (1%). Cutaneous markers of diabetes i.e acrochordons were observed in 17% cases. The other manifestations observed were lichen planus (6%), PLE (3%), psoriasis (3%), vitiligo (2%), Kyrles disease (2%), infected eczema (2%), scabies (2%), lichen simplex chronicus (2%) and pemphigus vulgaris (1%).

**Conclusions:** The physicians should be aware of cutaneous manifestations in diabetes mellitus. Where the ignorance of skin manifestations in diabetes or improper treatment may makes the condition worse. The early detection and early treatment of common skin manifestations in diabetes will prevent further complications or ineffectiveness due to treatment especially in cases of carbuncle, extensive *tinea corporis*, psoriasis, lichen planus, macro and micro angiopathies, trohic ulcers etc. A well-controlled diabetes by drugs, diet and exercise will allow the patient to lead a normal life like any other normal individuals.

**Keywords:** Cutaneous manifestations, Diabetes mellitus, Skin manifestations

## INTRODUCTION

Diabetes mellitus is commonest metabolic disorder affecting the people all over the world. In global arena, even though diabetes has been known since antiquity and in last five decades new discoveries have provided great hopes, there are continuous research efforts to find ways and minimize morbidity and mortality which continues unabated.<sup>1</sup> It is estimated that there are 10 million diabetics in India and for every diagnosed diabetic there is another undetected diabetic. The Manifestation of diabetic in tropic has distinct features. Genetic ecological and nutritional factors greatly influence the metabolic profile of such diabetes, while evolution of vascular diseases in this population may be related to degree and duration of carbohydrate metabolic abnormality. Diabetes mellitus is a fairly common medical disorder that involves almost every specialty in its spectrum of clinical manifestation, and up to 1/3<sup>rd</sup> of patients with diabetes mellitus are estimated to have cutaneous changes. In other words using broadest criteria all subjects with diabetes will develop cutaneous manifestations of this disease.<sup>2</sup> The skin manifestations in diabetic state are also seen in non-diabetic state. The exact pathogenesis of most skin findings associated with diabetes mellitus are generally unknown. Recently attention is focused on one factor common to all from of diabetes-Hyperglycemia. But the probable pathogenetic factors causing skin manifestation are mainly hyperglycemia, macro and microangiopathy, and neuropathy.<sup>2</sup> There are very few Indian studies available on cutaneous manifestation associated with diabetes mellitus hence present thesis is undertaken to study cutaneous manifestations, associated with diabetes mellitus in patients attending civil hospital, Belgaum and K.L.E'S Hospital, Belgaum, India. The present study was undertaken to ascertain different cutaneous manifestation of diabetic patients presenting with skin manifestations. Cutaneous complications due to ant diabetic therapy.

## METHODS

A total of 100 diabetic patients with cutaneous manifestations, who attended skin OPD at Civil Hospital, Belgaum, Karnataka and K.L.E'S Hospital and Medical Research Centre, were randomly selected. The present study was conducted over a period of 22 months from March 1995 to December 1996. All the cases were examined with a detailed history, physical examination, cutaneous and mucous membrane involvement. Diabetes mellitus was confirmed by urine sugar and blood sugar estimation.

The following investigations were done-routine blood examination like HB%, total count, differential count and ESR were done in all cases; urine routine and for sugar and albumin was done in all cases; blood sugar estimation that is fasting blood sugar or random blood sugar was done in all cases; direct examination of scraping taken from involved sites to demonstrate

fungal elements in dermatophytoses and wet smear examination under 10% KOH was also done for candidial infections. Examination of pus, discharge were taken for gram's staining for demonstrating organism; culture and sensitivity for bacterial and fungal examination was done in selected cases; biopsy of skin lesions from involved site were done in selected cases.

## RESULTS

The present study was conducted over a period of 22 months from March 1995 to December 1996. Total 100 cases were included in the study.

**Table 1: Age wise distribution of the cases.**

Age (in years)	Number of cases	Percentage
10-20	2	2
21-30	5	5
31-40	12	12
41-50	23	23
51-60	14	14
61-70	13	13
71-80	1	1

As per Table 1, nineteen patients were within the age group of 40 years. Constituting 19%. The lowest age of patient was found in two patients who were of 20 years of age.

As per Table 3 and 4, about 38 cases were having fungal infections (includes) *Tinea corporis*, *Tinea cruris*, *Tinea Versicolor*, *Candidal inteetrigo*, *Candidal vulvovaginitis*, *Candidal balanoposthitis* and oral candidiasis constituting 38%. In this study, 13 cases were having bacterial infections (includes carbuncle, folliculitis, furunculosis and palmar abscess) as shown in Table 3 and 4 it constitutes to 13% of total cases. As per Table 3 and 4, 17 cases presented as generalized pruritus which constitutes 17% of total cases.

In present study 81 patients above 40 years constituted 81%. The oldest person in the present study was of 72 years age.

As per Table 2, out of 100 cases 62% were males patients and 38% were female patients. The male to female ratio was 1.6:1 approximately.

Seventeen cases of acrochordons were observed of which 5 cases were associated with generalized pruritus, 3 cases were associated with *Tinea cruris*, 2 cases were only having acrochordons, 2 cases of skin tags were having associated monilial intertrigo and one case each was associated with infected eczema, furuncle, folliculitis, *tinea pedis* and psoriasis respectively.

Lichen planus was seen in six cases constituting 6% of total cases.

As per table 3 and 4, three cases of psoriasis was observed, out of which one case had associated skin tags. Thus, 3% of cases were observed. Two cases of Kyrle's disease were observed in this study as shown in table 3 and 5 i.e. 2% of total cases. As per table 3 and 4, viral infection constitute 2% of total cases, out of which 1 case was of herpes simplex and 1 case of herpes zoster, respectively. One case of lipoatrophy associated with *Tinea cruris* was observed i.e. 1% of total cases. Two cases of photodermatitis were observed which constitutes 2% of total cases. There were two cases of infected eczema, which constitutes 2% of total cases. Monilial balanoposthitis was observed in 5 cases, of which 4 cases had phimosis.

**Table 2: Gender wise distribution of the cases.**

Gender	Number of cases	Percentage
Males	62	62
Females	38	38

**Table 3: Associated skin disease with diabetes.**

Skin disease	Number of cases	Percentage
Tinea corporis	6	6
Tinea pedis	5	5
Tinea cruris	3	3
Tinea versicolor	3	3
Candidal Intertrigo	8	8
Candidal vulvogaginitis	6	6
Candidal Balanoposthitis	5	5
Oral Candidiasis	2	2
Folliculitis	8	8
Furuncle	2	2
Carbuncle	2	2
Palmar Abscess	1	1
Generalized Pruritus	17	17
Acrochordans	17	17
Lichen planus	6	6
Psoriasis	3	3
Polymorphic light eruption	3	3
Kyrle's disease	2	2
Lichen simplex chronicus	2	2
Scabies	2	2
Vitiligo	2	2
Herpes simplex	1	1
Herpes zoster	1	1
Pruritus ani	3	3
Prurigo simplex	1	1
Pemphigus vulgaris	1	1
Photodermatitis	2	2
Lipoatrophy	1	1
Infected eczema	2	2

The above table shows that most of the patients presented with multiple symptoms. As per Table 5, symptoms like polyurea (94%), polyphagia (75%), polydypsia (89%). Loss of weight (19%), generalized pruritus (17%), painful sensation (14%), itching on genitals (5%) were observed. Accordingly above symptoms were observed in all diabetic patients except in 14 patients who were detected underlying diabetes following skin symptomatology.

**Table 4: Cutaneous manifestations associated with diabetes.**

Disease associated with diabetes	Percentage
Fungal	38
Bacterial	13
Acrochordans	17
Generalized pruritus	17
Lichen planus	17
Psoriasis	3
Polymorphic light eruption	3
Pruritus ani	3
Parasitic infection (scabies)	2
Vitiligo	2
Kyrle's disease	2
Infected eczema	2
Viral infection	2
Lichen Simplex Chronicus	2
Photodermatitis	2
Lipoatrophy (Localized)	1
Bullous disease	1
Prurigo simplex	1

**Table 5: Symptoms at the time of study period.**

Symptoms	Number of cases	Percentage
Polyurea	94	94
Polyphagia	75	75
Polydypsia	89	89
Loss of Weight	19	19
Generalized pruritus	17	17
Painful sensation	14	14
Itching on genitalia	5	5

**Table 6: Patients on ant diabetic therapy.**

Modes of therapy	Number of cases	Percentage
Only on insulin	10	10
Oral hypoglycemic therapy	76	76
No treatment	14	14

Table 6 showed that out of 100 cases studied 10 patients were only on insulin therapy the other 76 patients were on hypoglycemic drugs. The other 14 patients who were detected during the investigations have been referred to diabetic clinic for further management.

As per Table 7, about 76 patients were on oral hypoglycemic drugs, and 10 cases were on insulin therapy. Out of these, 3 cases were detected having complications due to antidiabetic therapy of which 2 cases had photodermatitis probably due to oral antidiabetic therapy i.e. sulphonylureas. One case had localized lipoatrophy due to insulin therapy.

Gram's staining was carried out in 34 cases in the present study.

**Table 7: Complications due to therapy.**

Modes of treatment	No. of cases	Cases with complication	Complication
Oral hypoglycemic drugs	76	2	Photodermatitis
Insulin	10	1	Localized atrophy

**Table 8: Gram's staining.**

No. of cases	Diagnosis	Investigations/results
8	C. Intertrigo	Yeast and pseudohyphae
6	C. Vulvovaginitis	
5	C. Balanoposthitis	
2	Oral candidiasis	Gram positive cocci seen
5	Folliculitis	
2	Furuncle	
2	Carbuncle	
1	Palmar abscess	

**Table 9: Direct examination of scrapping with 10% KOH.**

No. of cases where KOH was done	Diagnosis	Results
8	C. Intertrigo	Positive for fungal elements
6	C. Vulvovaginitis	
5	C. Balanoposthitis	
2	Oral candidiasis	
6	T. Corporis	Positive for fungal elements
5	T. Pedis	
3	T. Cruris	
3	T. Versicolor	Negative for fungal elements
2	P.L.E.	

Out of 34 cases in whom gram's staining was done of which 21 cases were of candidal or monilial infection and remaining 13 cases had bacterial infection. As per Table 8, out of 21 cases of Candidiasis, 8 cases were of *Candidal intertrigo*, 6 cases were of *Candidal vulvovaginitis*, 5 cases of *Candidal balanoposthitis* and 2 cases with oral candidiasis. All candidal cases revealed gram's positive yeast cells and pseudohyphae. As per

Table 8, 13 cases with bacterial infection were subjected for Gram's staining, of which 8 cases were of folliculitis, 2 cases of furuncle, 2 cases of carbuncle and one case of palmar abscess.

10% KOH examination was done in 40 cases in present study. Out of these 40 cases, 21 cases were of candidiasis, 17 cases of fungal infection and 2 cases of polymorphic light eruption (P.L.E).

As per Table 9, all the 21 cases of candidal infections were positive for fungal elements i.e. pseudohyphae and budding spores were seen. Out of 21 cases of candidiasis, 8 cases were of candidal intertrigo, 5 were of candidal balanoposthitis 2 cases of oral candidiasis and 6 cases of candidal vulvovaginitis. All the 5 patients who presents with candidal balanoposthitis were uncircumcised. As per Table 9, total 17 cases of fungal infection were subjected for 10% KOH examination, of which 6 cases were of *Tinea corporis*, 5 cases of *Tinea pedis* and 3 cases each of *Tinea cruris* and *Tinea versicolor* respectively. Table 9 also shows, 2 cases of polymorphic light eruption (P.L.E) were subjected for 10% KOH examination, so as to rule out fungal infection and both the cases were negative for fungal elements under microscopy.

As per Table 10, out of these 13 cases of bacterial infections 8 cases were of folliculitis, 2 cases of furuncle and 2 cases of carbuncle. In all these cases staphylococcus aureus was isolated. In only one case of palmar abscess staphylococcus epidermidis was isolated on culture.

**Table 10: Culture of bacteria.**

Diagnosis of bacterial disease	No. of cases	Culture/Results
Folliculitis	8	<i>Staph aureus</i> isolated
Furuncle	2	
Carbuncle	2	<i>Staph epidermidis</i> isolated
Palmar abscess	1	

### *Lichen planus*

Histopathological examination in six cases of Lichen planus showed epidermal hyperkeratosis, focal hypergranulosis and mild irregular acanthosis with basal cell degeneration. Dermis showed band like lymphocytic infiltrate closely hugging epidermis and around blood vessels.

### *Psoriasis vulgaris*

All the 3 cases were subjected for histopathology. All of them showed classical histological features of Psoriasis vulgaris epidermal hyperkeratosis with parakeratosis, Acanthosis, elongated rete ridges and immediately beneath parakeratotic site spongiform pustule or munro

micro abscess was observed. Upper dermis showed mild chronic inflammatory infiltrate.

**Table 11: Culture for fungus.**

Diagnosis	No. of cases	Culture report
Candidal balanoposthitis	3	Candida isolated

#### ***Kyrle's disease***

Two patients of kyrle's disease were subjected for biopsy and histological section stained showed heavy keratotic partly parakeratotic plug occupying. Basophilic debris is present in parakeratotic layer. Dermis showed cell infiltration around blood vessels

#### ***Pemphigus vulgaris***

Only one case of pemphigus vulgaris was studied and subjected for biopsy and histological section stained showed, epidermal hyperkeratosis with suprabasal bullae formation and eosinophilic spongiosis.

#### ***Prurigo simplex***

Only one case of prurigo simplex was studied and subjected for biopsy and histopathological examination. Epidermis showed mild hyperkeratosis, irregular acanthosis and papillomatosis. The dermis showed marked perivascular round cell infiltration.

### **DISCUSSION**

Diabetes Mellitus is a common metabolic disorder that involves almost every specialty in its spectrum of clinical manifestation, thus skin is unique, dynamic, reactive and mirror of internal organs. No diseases of skin are peculiar to diabetes, yet there are diseases, the incidence of which is more common in diabetes than in non-diabetics. In present series 81% of patients were in age group of 41 years and above which constituted the major age group, having cutaneous manifestations associated with diabetes, whereas almost similar observation (74%) was made by Anand LC et al in his study.<sup>3</sup> Among those the infections, like bacterial, fungal and other associate diseases like necrobiosis lipodica diabeticomam, unexplained generalized pruritus or pruritus ani have been found to be more cooun in diabetics than in non-diabetics. Whether hyperglycemia is sole factor responsible for various skin conditions cannot be authentically accounted, for the lack of enough evidence.<sup>4</sup>

The sex incidence was found to be more in males (62%) than in females (38%) in the study by Thomas Georges et al.<sup>4</sup> In the present series similar observation was made showing 62% males and 38% females. The male preponderance was obvious in above 41 years age group, where similar observations were also made by Thomas George et al.<sup>4</sup>

#### ***Bacterial infections***

Thomas George et al in his study observed 14% of diabetic patients having bacterial infections.<sup>4</sup> But, Anand LC et al observed 26% of diabetic patients with bacterial infections.<sup>3</sup> In present series 13% of total diabetic patients had bacterial infections which are in concurrence with George T et al.<sup>4</sup> Hence examination of urine and blood for sugar is advisable in patients who have recurrent chronic bacterial infections. Diabetes mellitus may be background for various bacterial infections. Pyoderma developing in known diabetic signifies poor control.

#### ***Fungal infections***

Thirty eight (38) cases were found to have fungal infections constituting 38% which is malor group of coetaneous manifestations in diabetes in present study. Similar higher incidence of fungal infections (44%) was observed by George T et al whereas Anand LC et al observed fungal infections in 35% of cases.<sup>3,4</sup> In uncircumcised males, monilial balenitis, may be the first clue to diabetes. In present series 5% of diabetic patients presented with balanoposthitis 6% cases had vulvovaginitis, 8 % patients had *Candidal interteigo* and in 2% of cases oral candidiasis was noted. Almost similar observations were made by George T et al.<sup>4</sup> The poorly controlled diabetic patient is particularly at risk for developing severe acute mucocutaneous candidal infection.<sup>1</sup> In present study 2% of cases had oral candidiasis, of which one was unknown diabetic and other patient was irregular in treatment.

#### ***Viral infections***

Whether viral infections in diabetics are common or uncommon is a point of controversy. As such Brown et al states that there is high incidence of *Herpes zoster* with postherpetic neuralgia in diabetics, but Rogozzino and Melton et al found 15% diabetics with *Herpes zoster* infection and also concludes that *Herpes zoster* is not a risk factor for diabetes mellitus and vise-versa.<sup>5,6</sup> In present study there were two patients of viral infections that is one case of *Herpes zoster* and one of *Herpes simplex* which constitutes to 2% of total cases.

#### ***Psoriasis***

The existence of relationship between diabetes and psoriasis was suggested as early as 1897 by Strauss Pick et al.<sup>7</sup> also reports the presence of relationship between these two diseases. Green wood et al claimed 2.4% of diabetics had psoriasis.<sup>8</sup> These are several Indian studies indicating presence of relationship between the two diseases. Psoriasis and diabetes mellitus had been variously reported in literature as 2.4% to 5.7%.<sup>9</sup> In present series there are 3% of psoriatic patients with diabetes which is almost consistent with finding of above authors.

### ***Lichen planus***

An increased incidence of an abnormal glucose tolerance test in Lichen planus, particularly of recent onset has been already stated by Powell S et al and Jain RK et al.<sup>10,11</sup> An increased incidence of oral lichen planus in diabetes is observed by Jelinek et al.<sup>1</sup> In this series 6% of cases of lichen planus without oral lesions were found. Lisi and colleagues states that lichen planus (oral and cutaneous forms) are associated with an immunological defect and metabolic alternation respectively.

### ***Skin tags or acrochordans***

Acrochordans are associated with impaired carbohydrate metabolism and may serve for identifying patients at risk of having diabetes mellitus. Khana M et al noted 26.3% patients of skin tags with overt diabetes mellitus or impaired GTT.<sup>12</sup> Huntley AC et al also claimed a relationship between multiple, large hyper-pigmented tags and diabetes.<sup>13</sup> In present study skin tags are sign of diabetes is unproven at present. The association is suggested theoretically by fibroblast growth factor in diabetes and potentiation of effect of this factor by insulin.

### ***Generalized pruritus***

Persistence generalized pruritus is an indication for complete medical survey because this symptom is often associated with various medical diseases such as uremia, jaundice, lymphoma and internal malignancy. It should not be over looked that there are purely cutaneous reasons for generalized pruritus.<sup>4</sup> Anand LC et al quoted that pruritus of unexplained nature of generalized or localized type may be the earliest pointer to the existence of diabetes and also claimed 40% of diabetics having pruritus of unexplained origin.<sup>3</sup> In present series there were 17% cases of generalized pruritus along with diabetes mellitus, which is comparatively less as compared to the results of Anand LC et al. Demis et al showed 3% incidence of generalized pruritus in diabetes mellitus.<sup>14</sup> Localized anogenital pruritus appears to be manifestation of diabetes mellitus.<sup>1</sup> In this study 3% of patients were observed having pruritus ani. In present series we observed a case (1%) of Prurigo simplex.

### ***Vitiligo***

A close association has been found between vitiligo and diabetes mellitus. Dawber et al found that 4.8% of diabetics had vitiligo 4.5% to 7.7% frequency of vitiligo has been reported in late onset of diabetes.<sup>15</sup> Hajini GH et al though associated with both insulin dependent and non insulin dependent types of diabetes, in most of patients it is seen after age of 40 years.<sup>16</sup> In present study 2% of total patients having vitiligo were observed and both of them were of above 40 years.

### ***Kyrle's disease***

It is one of the features associated with diabetes mellitus as claimed by many authors like Jelinek et al also quotes that Kyrle's disease is usually associated with diabetes mellitus and chronic renal failure.<sup>1</sup> In present series 2% cases of Kyrle's disease were observed, of which one patient chronic renal failure had and was on dialysis.

### ***Eczema***

In present study there were 2% cases of infected eczema, and Lichen simplex chronicus constituting 4% of total cases. According to Anand LC et al one cannot say that the disturbed carbohydrate metabolism is cause of eczema.<sup>3</sup> It may be mere association, but carbohydrate intolerance must be given serious consideration in treatment of any refractory eczema which is resistant to treatment and which definite etiological factor is not detected.

### ***Parasitic infections (scabies)***

In the present study there were 2% of total cases having scabies who were known diabetics Klein LJ et al has noted a case of crusted scabies in diabetic alcoholic.<sup>17</sup> In present study, we have not come across diabetics having crusted scabies. The occurrence of scabies in diabetes may be a mere association.

### ***Phimosis***

In present series there were 5% cases of candidial balanoposthitis of which 4% cases had phimosis and all of the 5% cases were uncircumcised. Thomas George T et al quoted that balanoposthitis is a common presentation of diabetes mellitus and uncircumcised males, particularly having Monilial balanitis may be the first clue to diabetes.<sup>4</sup> In such cases, phimosis occurs due to balanoposthitis where there is uncontrolled diabetes mellitus and improper treatment.

### ***Pemphigus vulgaris***

It is an autoimmune disorder and is associated with pernicious anemia, Hashimoto's thyroiditis etc., but not diabetes mellitus. In present study we observed one case of pemphigus vulgaris.

### ***Photodermatitis***

It is a known complication of sulfonylurea Jelinek et al.<sup>1</sup> In present series 2% of the cases having photodermatitis were observed probably due to intake of sulfonylurea. These patients improved, when they were shifted onto Biguanides. We also observed 3% of cases having polymorphic light eruption.

### Lipoatrophy

Lipoatrophy is a known complication of insulin therapy and occurs more in young women and children.<sup>1</sup> It occurs due to impurities in insulin i.e. due to pork insulin or biosynthetic human insulin. In present study, we observed 1 case (1%) of a young female who was on pork insulin and had localized lipoatrophy. In present study, the common symptoms observed at the time of case study were, polyurea (94%), polyphagia (75%), polydipsia (75%), loss of weight (19%), generalized pruritus or itching (17%), pain (14%) and itching over genitalia were observed in 5% of cases. According to George T et al 4 common symptoms at the time of detection of diabetes were polyurea (50%), polyphagia (48%) polydipsia (44%), loss of weight (18%) lesional pain i.e. pyoderma (4%), itching over genitalia i.e. Monilial balanoposthitis (2%).<sup>4</sup> The observations of higher incidence of symptoms in the present study may be due to inclusion of old known diabetics, whereas the lower incidence of symptoms observed by George T et al may be due to recent onset diabetic patients.<sup>4</sup>

### Complications due to therapy

As stated earlier, we came across three complications due to therapy, two cases of photodermatitis (2%) and one case of localized insulin atrophy (1%). Photodermatitis was probably due to oral sulfonylureas, as the patient improved on changing to Biguanides. Localised insulin atrophy was observed in one (1%) young female, who was on pork insulin.

### Laboratory investigations

In present study, gram's staining was done in 34 cases (34%) of bacterial and candidal infections and all 34 cases revealed gram positive pathogens. Pus for culture was sent in 13 cases (13%) of which 12 (12%) showed *staphylococcus aureus* and 1 case (1%) showed *staphylococcus epidermidis*. According to Greenwood AM et al the lesions caused by *staphylococcus aureus* are commoner in diabetics than in non diabetics it is possible that this incidence indicates in the balance of bacterial flora favouring the multiplication of potentially pathogenic gram positive cocci.<sup>8</sup> Rayfeild et al also quotes that there is diminution of bactericidal activity for *staphylococcus aureus* and *e. coli* in diabetics.<sup>18</sup> It is also suggested that disturbed fluid balance rather than increased sugar content of tissues also contribute to the predisposition of diabetes to bacterial infection. Fungal culture was done in 3 cases (3%) of balanoposthitis which showed candidal growth in these cases culture was done to rule out mixed infection. In 40 cases direct microscopy with 10% KOH was done of which 38 cases were positive for fungal elements and 2 cases were negative which polymorphic light eruption were. In our study, all cases were hyperglycemic and showed glycosuria.

### Histopathology

Out of 100 cases who had cutaneous manifestations associated with diabetes mellitus. 12 patients were subjected for histopathological examination. The characteristic histopathological changes were observed in 5 cases of lichen planus, 3 cases of psoriasis, 2 cases of Kyrle's disease and one case of each pemphigus vulgaris and prurigo simplex respectively. There were no structural changes observed in surrounding normal skin in all patients whom biopsy was done. The authors like Jelinek, Huntley AC and George T et al have reported histopathological changes showing macro and microangiopathies in normal skin of diabetics and also in case of NLD and diabetic bullae.<sup>1,4,13</sup> In present series we have not come across the above mentioned disorders and no micro and macro angiopathies were observed in the biopsy section studied.

### CONCLUSION

Diabetes mellitus is a common medical disorder that involves almost every specialty in its spectrum of clinical manifestations. The skin is no exception and up to one third of patients with diabetes are estimated to have cutaneous changes. The importance of skin manifestations lies in fact, that they are often the first pointers to the diagnosis or deterioration of the disease. The physicians should be aware of cutaneous manifestations in diabetes mellitus. Where the ignorance of skin manifestations in diabetes or improper treatment may make the condition worse. The early detection and early treatment of common skin manifestations in diabetes will prevent further complications or ineffectiveness due to treatment especially in cases of carbuncle, extensive *tinea corporis*, psoriasis, lichen planus, macro and micro angiopathies, trohic ulcers etc. well controlled diabetes by drugs, diet and exercise will allow the patient to lead a normal life like any other normal individuals.

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